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ONTARIO WATER
RESOURCES COMMISSION

ANNUAL REPORT

1961

TOWN OF TRENTON

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ANNUAL REPORT

ON

TOWN OF TRENTON

SEWAGE TREATMENT PLANT

OWRC PROJECT - 57-S-4

TRENTON SEWAGE TREATMENT PLANT

OPERATED FOR

THE TOWN OF TRENTON

BY

THE ONTARIO WATER RESOURCES COMMISSION

Mr. A. M. Snider	-	Chairman
Dr. A. E. Berry	-	General Manager
Mr. D. S. Caverly	-	Assistant General Manager and Director of Plant Operations
Mr. B. C. Palmer	-	Assistant Director, Division of Plant Operations
Mr. A. Clark	-	Project Engineer, Division of Plant Operations

TOWN OF TRENTON

HISTORY

The Town of Trenton approached the OWRC in 1956 and requested aid in the finance, design and construction of certain sewage works. Gore & Storrie Limited, who prepared the original report in 1950, were asked to prepare the necessary plans and specifications.

In 1957, the Town of Trenton entered into an agreement with the OWRC for the construction and operation of sewage treatment facilities, the cost of which was to be repaid by the Town over a thirty year period.

Subsequent to the Ontario Municipal Board's approval, work was initiated on Stage I of the project.

Stage I was resolved to include:

1. 24" sewer on the west side of the Trent River and across to the Dundas Street pumping station.
2. Pumping Station at Dundas Street on the east side of the river.
3. 16" diameter force main from pumping station to sewage treatment plant.
4. Primary sewage treatment plant at Herman Street.
Capacity - 1.0 MGD.
5. 30" diameter outlet pipe from plant to 500 ft. off shore.
6. Interceptor and connecting sewers.

Total cost approximately - \$495,000.

Tenders were called for November, 1958 and work was begun in the spring of 1959.

The contracts for the various portions of the system were largely completed by December, 1959.

Plant Operations Division of the OWRC took over the operation of the sewerage system in January 1960, with Mr. A. Hockaday as operator.

Capital Costs of the Project:

	27,260.00	-	Connecting Sewers
	32,650.00	-	Force Main
	57,700.00	-	River Crossing
	17,225.00	-	Fairbanks-Morse
	94,567.00	-	Sewage Pumping Station
	187,204.00	-	Sewage Treatment Plant
	43,413.00	-	Interceptor Sewer on Ontario Street
	<u>33,000.00</u>	-	Engineering
	493,000.00		Approximate
<u>or</u>	<u>Sewers</u>		<u>Plant</u>
	27,260.00		17,225.00
	32,650.00		94,567.00
	57,700.00		<u>187,204.00</u>
	<u>43,413.00</u>		
	161,053.00		298,946.00
	<u>15,000.00</u> Engineering		<u>18,000.00</u> Engineering
	176,053.00		317,000.00

TYPE OF SEWAGE TREATMENT PLANT

Primary treatment with provision for extension to complete treatment.

DESIGN POPULATION

12,000 persons initially; 15,000 persons when extended to complete treatment and with provision for doubling to 30,000 persons. Initial grit removal, screening and outlet sewer facilities sized for 30,000 population.

PER CAPITA FLOW

83.3 Gallons per day.

DESIGN PLANT FLOW

1.0 MGD = 111.0 cu. ft./min. = 6,670 cu. ft./hr.

5 DAY BOD OF RAW SEWAGE:

250 ppm

Removal 35%

Suspended Solids of Raw Sewage:

200 ppm

Removal 55%

DIAMETER OF INLET SEWER:

24"

DIMENSION OF INLET CHAMBER:

The raw sewage flows through a 24" x 24" sluice gate into the aerated grit chamber from an inlet chamber.

DIMENSION OF GRIT CHAMBER:

10' -0" x 8' -6" x 9' -0"

VOLUME OF AERATED GRIT CHAMBER:

765 cu. ft. (not including the hopper)

DETENTION PERIOD:

$$1 \text{ MGD} = \frac{765}{110.0} = 6.95 \text{ minutes}$$

Grit removal by air lift to decanting trough and wheel barrow.

The sewage flows to the screen chamber and thereafter to the distribution channel of the settling tanks.

SCREENING:

One hand cleaned bar screen, with provision for installation of mechanically cleaned bar screen for ultimate plant capacity.

AVAILABLE AREA:

5.29 sq. ft.

PRIMARY SETTLING TANK:

2 units

DIMENSION OF TANKS:

2 (52' x 16' x 12')

VOLUME OF TANKS:

20,000 cu. ft. (not including the sludge hopper)

DETENTION PERIOD @ 1 MGD

$$\frac{20,000}{8350} = 2.4 \text{ hours}$$

SURFACE SETTLING RATE: @ 1 MGD

$$\frac{1,000,000}{2 (52' \times 16')} = 600 \text{ gal/feet}^2 \text{ of tanks/day}$$

$$\text{@ 1.25 MGD} \quad \frac{1,250,000}{2 (52' \times 16')} = 755 \text{ gals/feet}^2 \text{ of tanks/day}$$

WEIR OVERFLOW RATE:

$$\frac{1,000,000}{120} = 8300 \text{ Gals/lin. ft. of weir/day}$$

$$\text{@ 1.25 MGD} \quad \frac{1,250,000}{120} = 10,400 \text{ Gals/lin. ft. of weir/day}$$

RAW SLUDGE REMOVAL:

Longitudinal sludge collector to single sludge hopper each pass of settling tank.

TWO DIGESTION TANKS, TWO STAGE OPERATION

DIMENSION OF TANKS:

Diameter 28')	No. 1.	Diameter 28')	No. 2
Depth 23')		Depth 22')	

TOTAL VOLUME OF TANKS:

$$12,717 + 12,117$$

HEATED DIGESTERS CAPACITY

$$\frac{24,834}{12,000} = 2.08 \text{ cu. ft./capita}$$

First stage tank is heated by a sludge heater of capacity, 170,000 BTU per hour.

Recirculation of gas in the first stage tank is by gas pump with a capacity of 150 cfm. Gas withdrawn is used for plant heating as available. Provision has been made for both digestion tanks to be used as first stage tanks when the plant is extended for 15,000 persons, and a third digestion tank will be constructed as a second stage tank.

DIGESTED SLUDGE DISPOSAL:

Digested sludge is disposed of by tank truck haulage. In 1961, the Town removed the digested sludge.

VALVE HOUSE BETWEEN TWO DIGESTION TANKS:

Dimenions

Main Floor 12' -0" x 11'8" x 12' -6" high

Basement 12' -0" x 11'8" x 8' -0" high

CHLORINATION OF EFFLUENT:

One vacuum type chlorinator with capacity up to 350 lbs. chlorine per day gives a maximum dosage of 35 parts per million at average flow. A chlorine pipe direct from the control building discharges to outlet chamber.

METERING

Total plant flow - by Venturi Meter

AIR BLOWERS:

Two air blowers for aerated grit chamber and settling tank, entry channel, aeration.

Maximum Capacity of each blower is 75 cfm.

OUTLET:

Effluent is discharged to the Bay of Quinte at the mouth of the Trent River, through a 30" diameter outlet to 500 ft. off shore.

SEWAGE PUMPING STATION ON DUNDAS STREET

PUMP NO.: 1

CAPACITY: 700 IGPM

TOTAL HEAD: 53 feet

POWER REQUIREMENT

$$\frac{700 \times 53}{3300 \times 0.85} = 13.4 \text{ HP}$$

MAXIMUM PUMP R.P.M.:

Revolutions per minute: 900

PUMP NO. 2

CAPACITY:

3130 IGPM diesel - working through Johnson R. A. gear dr.

TOTAL HEAD:

100 feet

MAXIMUM PUMP R.P.M.:

900

PUMP NO. 3

CAPACITY:

1740

TOTAL HEAD:

65 feet

POWER SUPPLY:

$$\frac{1740 \times 65}{3300 \times 0.85} = 40.3 \text{ HP}$$

MAXIMUM PUMP R.P.M.:

600

Total Capacity of three pumps: 5570 IGPM

Pumps Nos. 2 and 3 have identical casing so that the capacity of pump No. 3 may be increased in future to the capacity of pump No. 2. Electric motors for driving the pumps Nos. 1 & 3 are drip-proof vertical, squirrel-cage induction type, suitable for full voltage starting and operation on three phase, 60 cycle alternating current. The meters comply with NEMA standards. The diesel engine

is of a type, suitable for operation on No. 2 fuel oil. An auxiliary fuel pump is supplied and installed integrally with the engine.

Bar screens at the inlet consist of two section of 2" x $\frac{1}{4}$ " bars, i.e. 2 sections of 15 bars @ 2" centers.

OVERFLOW PIPE:

24 " diameter

There is a force main on an easement from the Dundas Street sewage pumping station to the sewage treatment plant at Herman Street. It comprises 760' of 20" pipe and 2800' of 16" ϕ pipe.

OPERATION

The plant and pumping station were operated throughout 1961 by the OWRC operator, James Stewart. Operation is normally 44 hours per week. Use was made of casual help for several weeks in mid summer for cutting grass and cleaning down tanks.

On several occasions, the air lift pump was clogged with grit which had entered the sewer and had been pumped to the plant. The operator was aided by the Town of Trenton Works Department in cleaning out this grit. Members of the Works Department also operated the plant when James Stewart took his summer vacation.

Extensive maintenance work was carried out and among the equipment serviced were sludge pumps, heat exchanger and flow recorder. OWRC maintenance staff spent a total of 80 hours at the plant and pumping station. OWRC electronics staff spent 15 hours improving pumping controls.

Chlorination of the plant effluent was carried out from June 1st, 1961 to December 1st, 1961 as requested by the Division of Sanitary Engineering.

245,000 gallons of raw sludge were pumped to the primary digester and 98,000 gallons of digested sludge were removed by tanker from the secondary digester.

This would indicate that highly satisfactory digestion was accomplished.

It can be seen from Figures 1 and 2 that BOD and suspended solids removed are high for a primary treatment plant.

LABORATORY ANALYSES RESULTS

FIGURE I

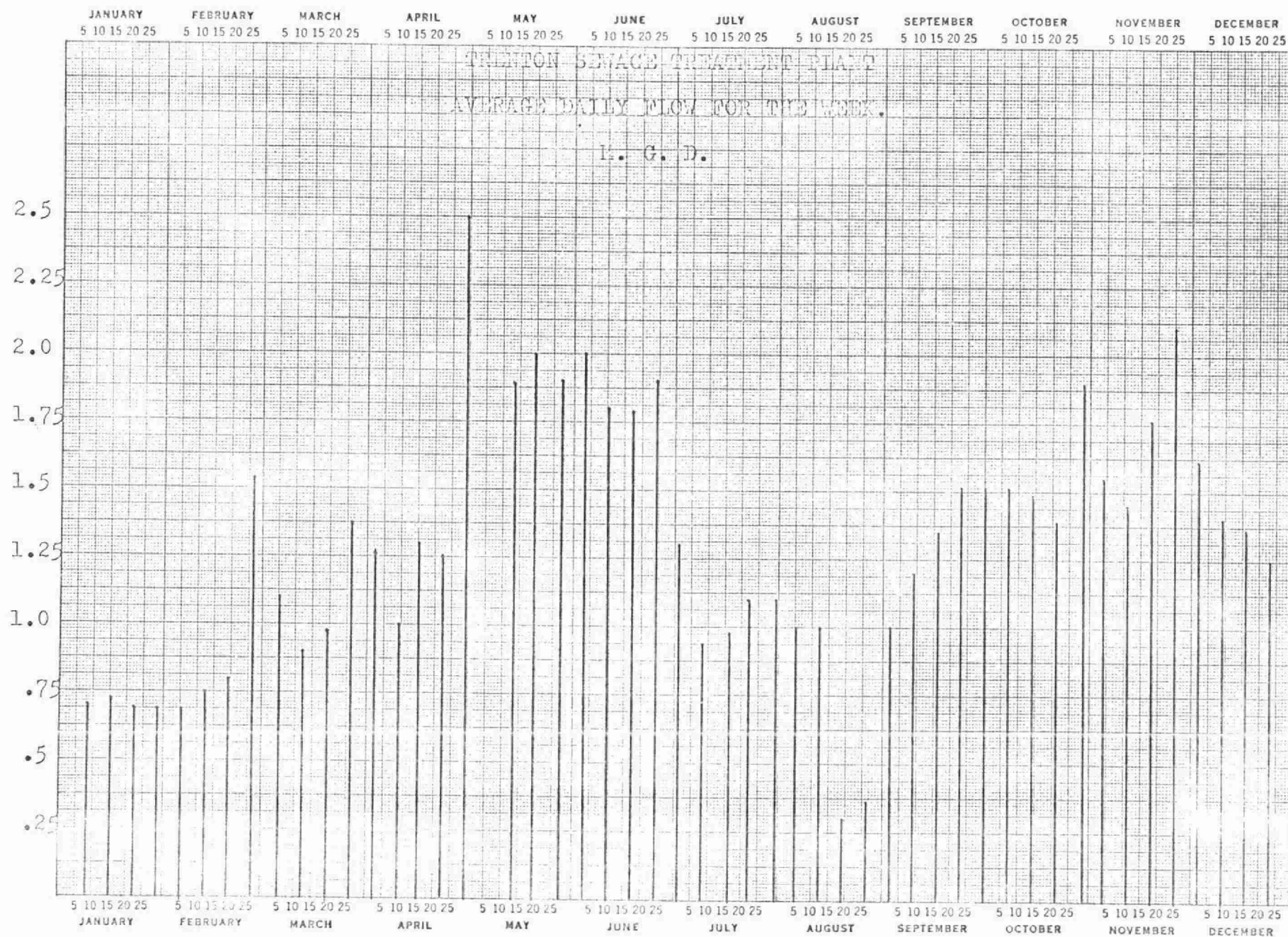
<u>DATE</u>	<u>INFLUENT</u>	<u>EFFLUENT</u>	<u>% REDUCTION</u>
13-2-61	160	70	56.5
4 - 11-61	84	42	50.0
28-3-61	72	54	25.0
24-5-61	85	32	62.5
20-6-61	75	30	60.0
26-7-61	92	23	75.0
29-8-61	125	38	69.0
26-9-61	165	26	84.0
24-10-61	115	50	56.5
28-11-61	145	61	58.0
12-12-61	130	50	61.5
AVERAGE	113.5	43.25	62.0

FIGURE II

<u>DATE</u>	<u>INFLUENT SUSPENDED SOLIDS PPM</u>	<u>EFFLUENT SUSPENDED SOLIDS PPM</u>	<u>% REDUCTION</u>
13-2-61	158	52	67.0
4-11-61	104	70	33.0
28-3-61	104	68	40.0
24-5-61	90	46	49.0
20-6-61	86	46	47.0
26-7-61	172	40	76.5
29-8-61	126	54	57.0
26-9-61	222	46	79.0
24-10-61	142	42	70.0
28-11-61	178	60	66.0
12-12-61	248	94	62.0
AVERAGE	148	56	62.0



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1 YEAR BY DAYS X 250 DIVNS.
CALENDAR YEAR

COSTS

1961

Operation	\$ 12,372.13
Debt Retirement	10,320.00
Reserve Fund	3,323.75
Interest	<u>26,231.50</u>
TOTAL	\$ 52,247.38

Sewage Treated	342,101 million gallons
BOD Removed	240,470 lbs.
Suspended Solids Removed	314,732 lbs.

Unit Operating Cost per 1000 gallons raw sewage treated	3.62¢
" " " " lb. of BOD removed	5.14¢
" " " " lb. of S.S. removed	3.93¢

Budget forecast for 1962

Payroll	\$ 4,400.00
Fuel	400.00
Power	2,800.00
Chemical	2,000.00
General Supplies	1,000.00
Equipment	200.00
Repairs and Maintenance	380.00
Sundry	2,200.00
Water	1,400.00
TOTAL	\$ 14,780.00

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